



Just the Facts...

Human Ehrlichiosis

Q. What is human ehrlichiosis? (pronounced “air lick ee OH sis”)

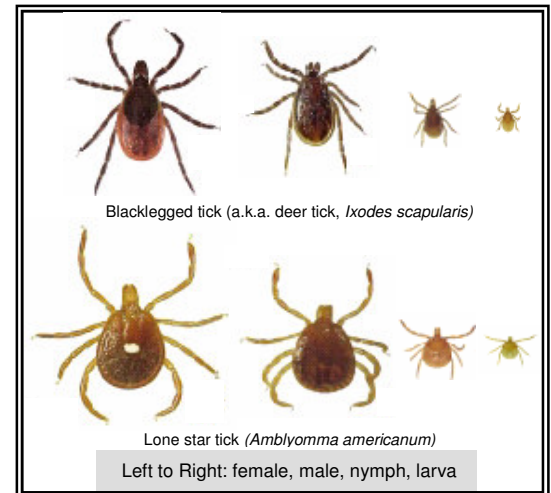
A. Human ehrlichiosis is a generic term for members of a group of tick-borne diseases known collectively as the “human ehrlichioses.” Each type of human ehrlichiosis is caused by a different, but closely related, type of very small bacteria (known as ehrlichiae) in the family *Anaplasmataceae*. These bacteria invade, and live within, white blood cells. The ehrlichiae were once thought to be only veterinary pathogens (disease agents).

Q. What are the different types of human ehrlichiosis?

A. Currently, there are several recognized types of human ehrlichiosis. In the U.S., the most common types are human monocytic ehrlichiosis (HME, caused by *Ehrlichia chaffeensis*), and human granulocytic anaplasmosis (HGA, caused by *Anaplasma phagocytophilum* -- formerly known as human granulocytic ehrlichiosis, HGE). Recently, a small number of cases of HGE have also been linked to *Ehrlichia ewingii*, a pathogen commonly causing ehrlichiosis in dogs (canine granulocytic ehrlichiosis) and simply referred to as *Ehrlichia ewingii* infection. Another type of human ehrlichiosis only occurs in limited areas of Japan and Malaysia (Sennetsu fever, caused by *Neorickettsia sennetsu*).

Q. Do all ticks transmit human ehrlichiosis?

A. No. Different tick species transmit (are the **vectors** for) different ehrlichial pathogens, and consequently most cases of ehrlichiosis are reported within the geographic distribution of their associated vector ticks. The lone star tick (*Amblyomma americanum*) is the vector of *E. chaffeensis*, as well as *E. ewingii*. The majority of cases of HME (and HGE caused by *E. ewingii*) occur in the southeastern quadrant of the U.S., the area where the lone star tick is found. The blacklegged tick (a.k.a. ‘deer tick’, *Ixodes scapularis*) in the eastern half of the U.S. and the western blacklegged tick (*Ixodes pacificus*) along the west coast are the vectors of *A. phagocytophilum*. These are the locations where HGA most often occurs. The vector of *N. sennetsu* is currently unknown, although trematodes (flatworms) are suspected.



Q. When was ehrlichiosis discovered?

A. Ehrlichiosis was first recognized in 1935 as a disease in dogs (canine ehrlichiosis) caused by *E. canis*. In the 1960s, a number of military guard dogs stationed in Vietnam died from this disease. Ehrlichiosis in humans was discovered more recently. In the U.S., the first diagnosed case of human ehrlichiosis occurred in 1986 in a 51-yr-old man from Detroit who had been exposed to ticks in a rural area of Arkansas. In 1990, the agent of human ehrlichiosis was isolated from the blood of a U.S. Army reservist at Fort Chaffee, Arkansas. The new species of *Ehrlichia* was named *E. chaffeensis*, and the specific disease that it causes was designated “human monocytic ehrlichiosis” (HME) because the organism most often infects certain white blood cells known as monocytes.

In 1994, another type of human ehrlichiosis was recognized following a report in the Journal of the American Medical Association that detailed 12 cases of an ehrlichial illness that had occurred in Minnesota and Wisconsin from 1990 through 1993. Two of those patients died from complications and secondary infections. This type of ehrlichiosis was designated “human granulocytic ehrlichiosis” (HGE) because the organism most often infects white blood cells known as granulocytes. Since that time, cases of HGE have been routinely diagnosed. For many years, the species designation for the organism that causes HGE remained undescribed, going only by the name ‘HGE agent.’ Then, in 2001, research revealed that the organisms that cause ehrlichiosis in horses (*E. equi*), in sheep and cattle (*E. phagocytophilum*), and in humans (‘HGE agent’) were the same. Based on subtle genetic characteristics, that single organism has now been reclassified as *Anaplasma phagocytophilum*, and the disease it causes has been renamed human granulocytic anaplasmosis (HGA). In 1999, *Ehrlichia ewingii* was discovered to have infected granulocytes in several human patients, so the illness this organism causes has been termed *Ehrlichia ewingii* infection.

Prior to the discovery *E. chaffeensis*, *N. sennetsu* was the only pathogen known to cause ehrlichiosis in humans. Sennetsu fever is a mononucleosis-type illness first described in 1954. Sennetsu fever is rare, is usually very mild, and no deaths have ever reported.

Q. How prevalent is human ehrlichiosis?

A. The human ehrlichioses are recently recognized illnesses that were made nationally reportable to the Centers for Disease Control and Prevention (CDC) in 1999. From 1999-2006, over 3000 total cases of the human ehrlichioses have been reported by the CDC.

Q. What are the symptoms of human ehrlichiosis?

A. Symptoms of the human ehrlichioses begin in 1-21 (average 7) days following infection, and they resemble those of Rocky Mountain spotted fever (RMSF). Symptoms vary greatly in severity, ranging from an illness so mild that no medical treatment is sought, to a severe, life-threatening condition. The most common symptoms are fever, headache, chills, muscular aches and pains,




fatigue, and malaise, but may also include nausea, vomiting, swollen glands, diarrhea, loss of appetite, cough, shortness of breath, confusion, delirium, and coma. Rash is infrequent, especially in HGA (2-5% for HGA; up to 40% for HME) and when present may resemble the spotted rash of RMSF, although it is usually less prominent and more variable in appearance. Since the bacteria invade white blood cells, the body's immune system is adversely affected. This lessens the body's ability to fight other infections, and complications can quickly arise. In the most severe cases, kidney or respiratory failure occurs. There have been some deaths associated with both HME and HGA, although serious outcomes have been more frequently associated with HME.


Q. How is human ehrlichiosis diagnosed and treated?

A. A diagnosis of ehrlichiosis is confirmed by testing blood samples for antibody titers to the different bacterial species known to cause ehrlichiosis, and by observing the bacteria in different types of white blood cells. The antibiotic doxycycline is very effective for treating all types of human ehrlichiosis. No vaccine is available. Because human ehrlichiosis can be so severe, it is very important to obtain prompt diagnosis and treatment.

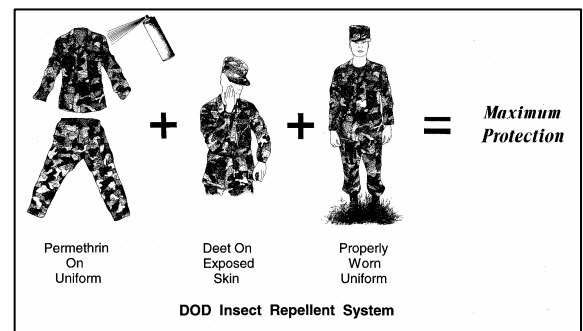
Q. What can I do to reduce my risk of becoming infected with human ehrlichiosis?

A. Help prevent human ehrlichiosis, and other tick-borne diseases, by protecting yourself from ticks. When in tick habitat (tall grass and weeds, scrubby areas, woods and leaf litter), follow these precautions:

-  Wear proper clothing as a physical barrier against ticks – long pants tucked into boots or tightly-woven socks; long sleeve shirt; shirt tucked into pants; and light-colored clothing so as to more easily spot ticks.
-  Check your skin and clothing periodically for ticks.
-  Use both skin and clothing repellents that have been approved by the Environmental Protection Agency (EPA). They are safe and effective.
 - For your skin, use a product that contains 20-50% **DEET** (N,N-diethyl-meta-toluamide). **DEET** in higher concentrations is no more effective.
 - Use **DEET** sparingly on children, and don't apply to their hands, which they often place in their eyes and mouths.
 - Apply **DEET** lightly and evenly to exposed skin; do not use underneath clothing. Avoid contact with eyes, lips, and broken or irritated skin.
 - To apply to your face, first dispense a small amount of **DEET** onto your hands and then carefully spread a thin layer.
 - Wash **DEET** off when your exposure to ticks, mosquitoes, and other arthropods ceases.
- For your clothing, use a product that contains **permethrin**. **Permethrin** is available commercially as 0.5% spray formulations. Clothing that is factory-impregnated with permethrin may also be purchased commercially.
- **Permethrin** should only be used on clothing, never on skin.
- When using any insect repellent, always FOLLOW LABEL DIRECTIONS.
- Do not inhale aerosol formulations.

 For optimum protection, soldiers should utilize the **DOD INSECT REPELLENT SYSTEM**. In addition to proper wear of the field uniform (ACUs, BDUs, DCUs) (pants tucked into boots, or tightly-woven socks when sleeping, sleeves down, undershirt tucked into pants), this system includes the concurrent use of both skin and clothing repellents:

- Standard military skin repellent: 33% **DEET** lotion, long-acting formulation, one application lasts up to 12 hours, NSN 6840-01-284-3982.
- Standard military clothing repellents: either aerosol spray, 0.5% **permethrin**, one application lasts through 5-6 washes, NSN 6840-01-278-1336; or impregnation kit, 40% **permethrin**, one application lasts the life of the uniform (at least 50 washes), NSN 6840-01-345-0237. Factory permethrin-treated ACUs are also available via contract [Contact the Armed Forces Pest Management Board (AFPMB) for details, DSN 295-7476; CM (301) 295-7476].



Q. What should I do if I find a tick attached to my skin?

A. Remove attached ticks as soon as they are found. Use tweezers to firmly grasp the tick's mouthparts up against the skin, and pull back firmly and steadily. Be patient – the tick's central mouthpart called the hypostome is covered with sharp barbs, sometimes making removal difficult. Don't pull back sharply, as this may tear the mouthparts from the body, leaving them embedded in the skin. If the mouthparts do break off, don't panic – the mouthparts alone cannot transmit disease because the infective body of the tick is no longer attached. However, to prevent secondary infection, remove the mouthparts as you would a splinter. Never squeeze the body of the tick or use such things as petroleum jelly, fingernail polish remover, or a lighted match: these methods could force more infective fluid into the skin. After removal, wash the wound site, and apply an antiseptic. Preserve the tick by placing it in a clean, dry jar, or other well-sealed container, and keeping it in your freezer. Should you develop disease symptoms, take the tick with you to the physician's office; identification of the tick species may assist the physician with your diagnosis and treatment. Discard the tick after a month; all known tick-borne diseases will generally display symptoms within this time period.